



HOW TO MAINTAIN A KLUDGE

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After proper attention has been paid to the design of the Kludge¹ and to its marketing,² the focus shifts to a necessary evil; namely, maintaining the thing. The customers seem to want maintenance, or at least the appearance of it, and without a large service organization, marketing the Kludge is difficult.

Of course, proper maintenance really begins with the design. The alert manufacturer carefully observes simple rules such as:

(1) Design the Kludge around fifteen basic circuit cards. Then, during production and in all subsequent field changes, modify each individual card with a resistor or condenser or such. This process soon produces a machine that really has 4200 distinct circuit cards, and *none of them is ever available in spare parts*. The maintenance man, of course, is continually gulled into thinking he has just

the card he needs (and he can reassure the customer to that effect). In trying to add that one resistor, he can delay operation of the machine indefinitely.

(2) Make all checking circuits non-fail-safe. If the checking circuit ever fails, then, the customer can have his machine down for days and never even know it. When he does notice that he's in trouble, he can have lots of fun proving it to the Kludge maintainer.

(3) Be sure to avoid any mention of possible hang-up conditions in the machine's reference manual. When one of these conditions is eventually encountered and the machine hangs up with no apparent cause, it will induce much merriment between the customer and the soldering iron jockies. Each separate such condition is good for half a day of downtime.

(4) Fix up lots of indicator lights that have meaning

only to the maintenance man. *Put these lights on the console.* They amuse visitors. The maintenance man will find them. He then either has to keep running back and forth to look at them, or he'll need another man to call them out to him. Proper application of this principle can cut the effectiveness of your service crew at least in half.

(5) Don't put all the fuses and circuit breakers in one place. Hide a few in obscure spots. Include some that give no visible indication when tripped; these are best placed *behind* something. It's an easy rule: the less chance there is for a fuse to trip, the more you hide it.

But all the above are obvious rules of design. Kludge-manship comes into its own in the field at the maintenance level. To the customer, the maintenance man (sometimes called the Kludge Fixer, or KF) is the on-the-spot representative of the vendor. The care and feeding of the KF warrants our attention. Again, experience dictates ele-



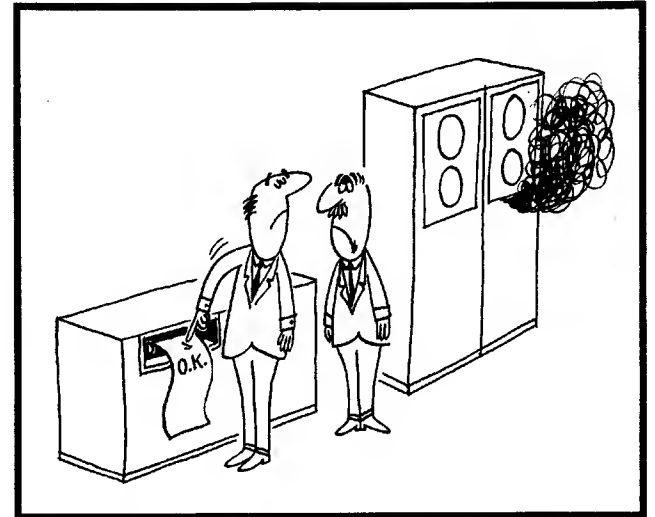
mentary, easy-to-follow rules.

(1) Don't pay them. If you did, you'd upset industry standards, for one thing. And these standards have been sensibly arrived at. After all, if you doubled their pay, you'd have the same quality of work done, wouldn't you, but costing twice as much? Of course you would! So try for high school graduates at the lowest possible salary

you can get by with. (If you remind them every day of the glorious opportunities ahead, they can stay at that low level for years. And there'll be a new crop along every June.)

(2) Indoctrinate them into the proper philosophy. Assure them, for example, that when they turn a checked-out machine over to the customer, then until the next scheduled period of maintenance, all troubles described by the customer are imaginary. Or, at the very best, the troubles are intermittent and have gone away by now. Teach them to ask "are you sure it isn't programming trouble?"—this always makes for good feeling.

Point out to them that they, not the customers, are really in charge of the machine. The customers are the ones who keep the tape drives spinning in those awkward intervals between maintenance periods, but the real purpose in all this is to keep the main frame warm.



Have them also learn to instill the proper philosophy into the customer. They should encourage the customer to learn to live with a malfunction, rather than be known as a chronic complainer. Eventually the user will find a way to "program around it," since he can't afford to have it known that he tolerates a machine with less than 90% of uptime.

(3) "Trust your diagnostics"—that's the watchword. Those diagnostics were designed by better men than you, son, and if they work, the machine works. If any part of the system could fail, the all-wise diagnostics would surely have revealed it. So in the final analysis, the job is simple: ignore what the customer is yapping about and run the diagnostics. Then if no errors are reported, the customer was obviously dreaming and can safely be ignored.

Be sure, of course, not to let the KF know anything *about* the diagnostics. If you do, you'll soon have some smart-aleck KF poking into one of them and trying to improve it.

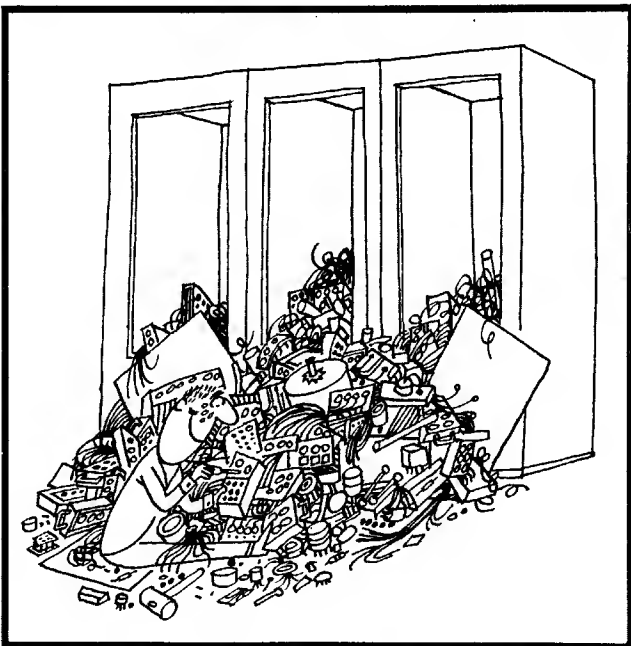
(4) Teach them to take first things first. If the customer reports more than one trouble at a time, then one of the troubles has higher priority than the others. It is only good sense, and good customer relations, to do that one first, right? But now notice that if you play your cards just right, some of the low priority troubles can slide along for weeks. A top notch man can sometimes stall one until his successor (some naive youngster) takes over. One of the all-time great KF's, Herman Schmelzer, managed to ignore a broken start key throughout the entire life of a machine.

(5) Operate on the symptoms, not the disease. This one is so obvious, it's almost not worth listing. Just as an example, suppose a tape drive won't read successive rec-

ords at high speed. The solution is to lengthen the inter-record gaps. That'll fix it.

Notice how nicely things begin to compound now? If a good solid glitch is designed into the machine, and the KF is carefully trained to operate only on its symptoms (all the while telling the customer that he's imagining his troubles), the Kludge may not function properly for years. And there is never any worry about competition, since all the other manufacturers know all these rules, too.

(6) Introduce your boys at an early age to the telephone. Point out to them that a good man can spend six out of every eight hours talking to other KF's at other installations (not to mention talking to wifey and all the other members of the bowling league). The customers at



both installations may believe that their troubles are being fixed.

(7) From time to time, circuit changes will have to be made on the machines in the field. Get several of your

best factory KF's to make the change and time them. Pick the shortest of these times. Then when the change is sent out to the field, quote this time as the estimate. The KF in the field can now play a real fun game with his installation managers. "Give me your machine for three hours to make this improvement," he says. It'll really take 53 man-hours, counting the shocking effect of rule (6). For best results, schedule these changes around month-end report time.

(8) In spite of all these eminently sensible rules, one of your boys may draw one of those oddball customers who insist that the whole Kludge work properly, even to the op-codes that are never used. There is one in every territory. Then the watchword is "If you can't fix it—inspect it." A thorough inspection requires that every part be disassembled, cleaned, oiled, and reassembled. And no customer has the gall to point out, after this lengthy process, that the thing still doesn't work. He's honor bound to prove it to himself all over, and the alert KF can apply rule (2) again. Incidentally, caution the KF's to dispose of the leftover parts after reassembly.

In spite of your good intentions, some of your men will wind up fixing machines. Pretty soon the customers notice this and get spoiled rotten. When this happens, your only recourse is rule 9:

(9) Transfer them. ■

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ABOUT OUR AUTHOR:

AUSTIN O. ARTHUR entered the computing field when it was young and he wasn't. He has spent roughly equal amounts of time with the U.S. Army, a major university, a large industrial organization, and a research group. He drives a VW.

The latter is not irrelevant. This article was originally prepared to describe maintenance procedures on American automobiles. It has been pointed out that it is only in the automotive and computing industries that members can get a big yak out of reading manufacturers' news releases verbatim at conventions.

Mr. Arthur is a member of ACM. He heads the Subcommittee on Monitor Systems for the 026.

NOTES:

(1) See *How To Design a Kludge* by Jackson Granholm, *Datamation*, February, 1962.

(2) See *How To Market a Kludge* by Oswald I. Orthmut, *Datamation*, May, 1962.